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by Agnes Pudjiastuti

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Sugar Price Policy and Indonesia's Trade Balance

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Abstract:

Sugar price policy always directed at conditions in which supply is equal to demand. This study aimed to evaluate the impact of increase in sugar prices on Indonesia's trade balance. Evaluation was done by using Tables I-O and SAM Indonesia in 2008 to developed Computable General Equilibrium (CGE) model. Indonesian economy were aggregated into 23 sectors with 8 households and 3 primary input. An increase in sugar prices of Indonesia have an impact on domestic output, exports, imports and trade balance. In agricultural sector, domestic output and imports increased, exports dropped, but Indonesian trade balance was still surplus. While the industrial and service sectors, domestic output and exports dropped, as well as imports increased, but the trade balance was deficit. Sugar imports even increased by 9.09%. It needs to watch out by the government because it could lead to a deficit in the trade balance.

Keywords: sugar price; balance of trade; surplus; deficit; Computable General Equilibrium.

JEL Classification: D58; D59; E37; F10.

Introduction

Sugar consumption in Indonesia has been growing very dynamically in recent years, include in Thailand, Canada, Turkey, Dominican Republic, South Africa, Colombia, Australia, USA, EU 27, Egypt and India (Svatoš 2013). Surge in demand for sugar, will affect the price of sugar, ceteris paribus. In Indonesia, sugar price is determined at beginning of auction level. However, since 2001, issued a policy through Minister of Industry and Trade in sugar floor prices (HDG) or buffer price as determined by cost of sugar production including farmers' profits by 10-12% and revised every year (KPPURI 2010). HDG was set to help sugarcane farmer if sugar auction price was below the floor price, where its difference will be paid by government into bailouts form. Government attempted to improve sugar production in 2009 by raising sugar price to IDR 8000.00/kg. However, in 2010 domestic sugar production even fell to 2.3 million ton due to climate change. Therefore, in 2010 government raised sugar price to US $9000.00/kg.

By implementing sugar price policy, the market was always directed at a conditions that supply is equal to demand. Supply may not exceed demand because sugar price will be in-expensive, which will surely hurt the farmers. Similarly, also supply should not be smaller than demand because it would harm consumers by creating high sugar prices. Thus, an ideal sugar price is the price that affordable for consumers, but also profitable for sugar producers. But happened was price of sugar to be expensive because auction price remained above floor price and resistance from farmers who do not want the auction price of sugar was cheaper than IDR 8,000, -per kg.

Policies were now seems to be more directed at a favorable farmers' sugar price. In this case, protected to producers tend to be a priority by government.

The higher sugar prices are expected to stimulate farmers to increase sugarcane production. Sugar production will be increased because of supply of raw material (sugarcane) is greater. As a result, domestic sugar needs of the consumers will be fulfilled, so that sugar imports will be reduced. Within the framework of international trade, this situation will create better trade balance.

Based on the concept of general equilibrium, a rising in price of sugar will not only affect sugar market, but also the markets commodities produced by other sectors. Therefore, this study was intended to evaluate the impact of an increase in sugar prices on Indonesia's trade balance.

1. Literature Review

1.1. Determination of Sugar Prices in Indonesia

A rising domestic prices will encourage domestic producers to increase their production. When domestic output rises such that domestic supply is greater than domestic demand, the excess supply can be exported. Thus, a rising sugar price will increase the export of sugar sector or change the status of importer to an exporter. But when domestic supply is still lower than domestic demand and imports are residual, a rising sugar price has effect of lowering imports. This also applies to other sectors. On the other hand, an increase in relative sugar price is likely to increase the real inputs price that used in the manufacture of sugar according to Stolper-Samuelson theorem, will affect income of producers (sugar and other commodities).

Aksoy and Hoekman (2010) stated that arise in output prices also have an important indirect impact. For example, an increase in output prices will result in an investment that can improve agricultural productivity and supply so as to compensate for the short-term negative effect on consumption. An increase in sugar price can also affect the demand for various products, whether related to agricultural production (e.g. fertilizers, transportation, industries that use agricultural raw materials, etc.) or not. A rising sugar prices will also affect food and beverage industry, and pharmaceutical industry that was called KPPURI (2010) as the largest consumer of sugar industry. This will affect domestic consumers as well as other economic actors.

Sugar prices in Indonesia established by government in floor price of sugar, and the auction price is likely to increase from year to year. Therefore, world sugar prices are relatively lower than domestic sugar price, in which Indonesia is a small country in the world sugar trade, so that Indonesia using trade policy instruments which is import tariffs to protect producers. In fact, world sugar prices was always fluctuated, so a policy which more appropriate to applied in Indonesia is progressive import tariffs.

1.2. A Rising Price of Sugar According CGE Model

CGE model developed here was how to introduce sugar price in the economic model that an increase in sugar price will affect domestic sugar production, import and export of sugar, as well as other sectors and trade balance. CGE models have many advantages including: reveal an impact on production, consumption, trade, investment and overall spatial interaction of a policy or shocks (Sadoulet and de Janvry 1995), the impact of economic changes on various government policy packages (Buehrer and Mauro 1995), model of development planning, as well as changes in economic and market transition (Yeah *et al.* 1994). CGE is a system of mathematical equations that represent the activities of agency, i.e. factors of production (labor, capital and land), production, and institutions (households, government, and enterprises) in an economy (Resosudarmo 1997).

An impact of rising sugar prices in the framework of macroeconomic balance was illustrated in Figure1. Equilibrium conditions in various markets before and after an increase in sugar prices was reflected in four quadrants. It was assumed that all of production factors was used in fully employed, aggregate production level was indicated by production possibility frontier curve located in quadrant IV, which reflects a possibility of transformation between exports (E) and domestic market destination (D). Sugar exports (E) was used to obtain sugar imports (M) through trading on the foreign exchange market (foreign exchange market) was depicted in quadrant I, in which the relationship between two items resulted in balance of trade. Domestic production of sugar sold in domestic market (D) was described in quadrant III. Relating to third quadrant, it can be seen that the level of consumption frontier in quadrant II met from a combination of domestic sugar (D) and sugar imports (M).

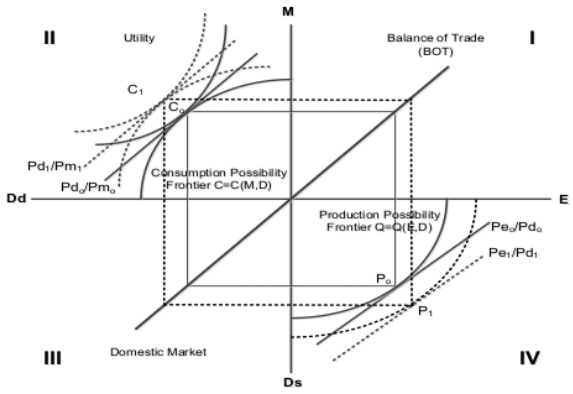

Figure 1. Effect of sugar price increase of macroeconomic balance

Description: M = commodities imports, E = commodities export, D = commodities domestic, C0 = the consumption frontier before domestic sugar prices increase, P0 = the production frontier before the domestic sugar prices increase, C1 = the consumption frontier after domestic sugar prices increase, P0 = the production frontier after domestic sugar prices increase, Pe0/Pd0 = export prices relative to domestic prices before domestic sugar prices increase, and Pd0/Pm0 = domestic prices relative to import prices before the domestic sugar prices increase, Pe1/Pd1 = export price relative to domestic prices after domestic sugar prices increase, and Pd1/Pm1 = domestic prices relative to import prices after the price of domestic sugar increase.

Source: Sadoulet and de Janvry (1995); Pudjiastuti *et al.* (2013), modified.

It was assumed that all factors of production have been used (fully employed), aggregate production level represented by production possibility frontier curve that lies in quadrant IV, and reflecting possibility of transformation between exports destination (E) and domestic market destination (D). Exported sugar (E) is used to obtain imported sugar (M) through trading in foreign exchange markets are depicted in quadrant I, where the relationship between two items resulted in balance of trade. Domestic production of sugar that are not exported (D) sold in domestic market are depicted in quadrant III. In relation to the third quadrant, it can be seen that the level of consumption frontier in quadrant II fulfilled from a combination of domestic sugar (D) and import sugar (M).

In quadrant I assumed there was no foreign capital inflow and export price equal to import price shown by slope of trade balance. In quadrant II, the curvature of utility curve is a function from consumption frontier at point C and relative equilibrium prices Pd/Pm. As for the production side in quadrant IV associated with P production, the curvature of the production possibility frontier curve is determined by relative prices of exports and domestic sugar (Pe/Pd). Furthermore, the solution of macroeconomic equilibrium in this model can be observed in quadrant II, which shows consumer demand behavior i.e. a certain level of utility at C consumption and the P production.

An increase of sugar prices would be responded by sugar producers to increase their production. As basic needs, a rise of sugar price willbe followed by an increase of other commodity prices in which other producers will also give response were not different as sugar producers so that the quantity of goods production will rise from Po to P1. Assuming, as previously mentioned and additional assumption that a decline in production of commodities that compete with sugar less than another commodity production increase, the amount of commodity supplied to domestic and export markets will also increase. Because of exported goods used to obtain goods imports, the imported goods will also increase. Ultimately, the economy will be able to increase the consumption of Co to C1. This situation will also improve trade balance.

2. Methods

Table I-O and SAM Indonesia in 2008 was used as database in this study. These secondary data were published by Central Bureau of Statistics (BPS = Badan Pusat Statistik). An impact of rising sugar prices on export, import and trade balance of Indonesia evaluated using quantitative methods, were called static CGE models. This modelwas developed from CGE models by Hosoe *et al.* (2010); Lofgren *et al.* (2002); Woods-Early (2006).

CGE analysis procedures performed through several stages as shown in Figure 1. CGE model was developed with Table I-O and SAM Indonesia in 2008 as a baseline. Assuming that must be fulfilled are: (1) aggregate demand (AD) equal to aggregate supply (AS), (2) pure profit is equal to zero, and (3) the costs equal to revenue (sales). If these assumptions are fulfilled, then the data can be used as basic data of CGE model. If this

assumption was relaxed, then do check again. Furthermore, calibration was done by modifying and combining some elasticity values and parameters with basic data CGE models. If the process has been followed the procedure GAMS/MPSGE program (Markusen and Rutherford 2004), and the next stages were performed analysis and simulation. The last stages was compare simulation results and initial equilibrium conditions. CGE models on sugar aggregating Indonesian economy into 23 sectors, consist of six agricultural industry, one mining industry, seven manufacturing industry, and nine service industry. Each sector using three production factors, that is labor, capital and intermediate inputs to transform them into output.

Assumption used that Indonesia adheres to an open economy and he is a small country in the world sugar trade. Households are divided into 8 groups. Labor was divided into skilled labor and unskilled labor. Other production factors, namely capital was not aggregation. Other assumptions used in this model were: production function constant return to scale, supply fixed factor, a perfectly competitive market, full employment and primary inputs can fully mobile among sectors.

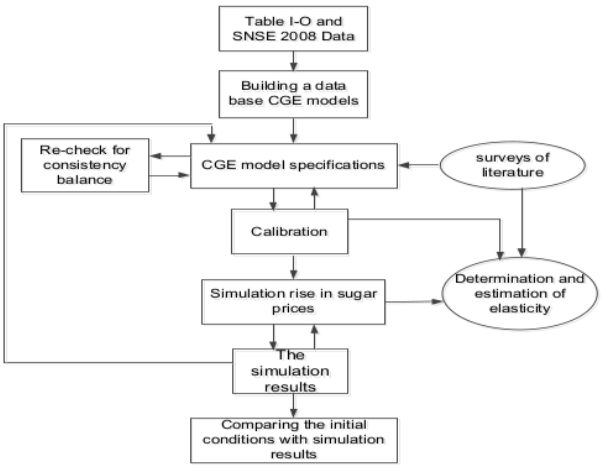

Figure 2. Analysis procedure

Indonesia does not discriminate against all sources of imports so that the average tariff rate for each sector is applied equally. Supply of goods differentiated on domestic goods and imported goods, so that domestic prices and import prices in Indonesia is different. In other words, trade is modeled on the assumption Armington (1969). Intermediate inputs and finished goods are differentiated by source of imported and domestic. Domestic intermediate input and imported intermediate inputs for each commodity were aggregated into composite input using CES functions that allow for substitution is not perfect between them. According to Choi (2014), in the CGE model, prices are decision variables of the 'market.' They are not decision variables of an individual industry or consumers.

3. Results

3.1. Role of Sugar Sector in Indonesia

Sugar has an important role in Indonesian economy. Sugar produced in this country to use domestic inputs among all sectors in Indonesia, except fisheries. Sugar industry also uses import intermediate inputs coming from its own industry and other sectors, namely fishing, paper and printing industry and services sector. Value of intermediate inputs used in sugar production in 2008 was IDR 3575,96 billion, consist of domestic intermediate inputs (98%) and import intermediate inputs (2%).

Sugar industry is a capital intensive industry because it uses more capital (58%) compared to the work force (42%). It implications is development of sugar industry will open up investment opportunities rather than employment. Largest revenue (81%) comes from the output of sugar used in the food and beverage industry, while 11% came from the restaurant and hospitality.

Thus, sugar industry has backward linkages and forward linkages with other sectors in the Indonesian economy. The question is how the policy of raising the price of sugar will impact on these sectors and on Indonesia's trade balance?

In simple terms, trade balance of a country indicates the difference between exports and imports. Therefore, it will be explained in advance about impact of rising sugar prices on exports and imports in sugar industry and other sectors. Within a framework of general equilibrium analysis, noted that domestic output and imports represent a number of items to be sold (supply) in the domestic and export markets.

3.2. Changes in Domestic Output, Export, and Import

An increase in sugar price by 10% have varying economic impact on sectors that exist in Indonesia, as presented in Table 1.

Table 1. Changes in domestic output, export and import if sugar prices increase 10%

No.	Sector	Domestic Output		Export		Import	
		Baseline (trillion IDR)	Change (%)	*Baseline* (trillion IDR)	Change (%)	*Baseline* (trillion IDR)	Change (%)
1.	Food crops	3.352	-0.69	26	0	61	-1.64
2.	Sugarcane	246	10.16	0	0	138	2.17
3.	Other crop farming	778	-0.13	524	0.19	16	0
4.	Animal husbandry and results	752	0	1	0	56	0
5.	Forestry and hunting	62	-1.61	0.471	-1.37	3	0
6.	Fishery	850	-0.82	71	-1.41	5	0
7.	Mining	837	0.36	412	0.97	185	-0.54
8.	Sugar industry	376	9.57	0	0	11	-9.09
9.	Food and beverages industry	4.338	-0.25	4.017	0.10	197	-0.51
10.	Spinning and textile Industry	1.790	-0.06	1.194	0	201	0
11.	Wood industry and manufacture	759	-0.40	208	-0.96	76	-1.32
12.	Paper and printing industry	2.820	-0.11	879	-0.11	2.743	-0.04
13.	Fertilizer and pesticide industry	142	0	7	0	135	0
14.	Chemical industry and cement	597	2.35	198	3.03	966	0.10
15.	Electricity, construction and trade	11.337	-0.04	0.292	-1.45	1.451	0.48
16.	Restaurants and hospitality	252	0	22	0	153	-0.65
17	Services	3641.366	-1.31	895.528	-5.99	901	0.69
	Total	9316.003	17.02	3249.502	-7	3108.194	-10.35

Bank of Indonesia suggested that sugar is a strategic commodity that as an important role in Indonesian economy because it is one of the staples consumed by all segments of society. Analysis results in Table 1 indicate that an increase in sugar prices impact on domestic output of agriculture, industry and services. In agricultural sector, the higher sugar prices will encourage farmers to increase production of sugarcane, but it will reduce domestic output of other agricultural sectors. In the context of general equilibrium, Stolper-Samuelson theorem can be used to explain the effect of an increase in sugar prices. This theorem states that an increase in relative price of goods will increase real price factor used intensively in goods and lower real price of other factors (Feenstra 2002). Empirical data also proves the existence of substitution between sugarcane land use with a variety of other agricultural commodities, except for farms and the results. An interesting fact, the increase in sugarcane output was not yet able to reduce imports of sugarcane, the main raw material imports even sugar industry is likely to rise.

In industrial sector, an increase in sugar price would increase output of sugar industry, chemical industry and cement, as well as mining sector. Only two sectors whose exports would fell, while five sectors experienced a decline in imports. Specialized in sugar industry, a rising of sugar price would encourage sugar mills to increase production. Although not able to export, policies to increase sugar price would reduce imports of sugar.

A raising of sugar price by 10% turned out to have an impact on services sector. Domestic output of services sector would decline. Export value of this sector also would fell, but its imports would rose. A rise in a commodity price will encourage businesses to increase production. As a result, there will be more domestic sugar circulating in domestic market so that quantity of goods to be sold in composite domestic market. In short term (assuming that domestic demand has not changed), this situation allows a sector to reduce imports.

Results of research by Oktaviani and Asmarantaka (2010) shows that an increased price was associated with an increased in real GDP, real household consumption, real wages of farmers and consumer price index, and sustained food security for rice and maize. However, for soybeans higher prices led to decreased food security because of the high import share.

High rice prices have been a large burden on consumers and have been a primary cause of the surge in poverty in recent years. Allowing rice price to fall by IDR 430/kg through elimination of the current rice import tariff would do more for poverty alleviation in Indonesia than all other government programs combined (Leith *et al.* 2003).

Effects of the crude oil price increase are traced through the economy, from markets, industries through to factors, households and government. Predictably, the shock hurts the economy: a 20 per cent increase results in a drop in GDP of 1 per cent. It was found that the major impact was to be found in petroleum industry itself, whereas the effects on liquid fuel dependent industries such as transport was not as large as may be supposed. In agriculture, it was found that the depreciating currency has a positive effect, offsetting most of negative effects of higher petroleum prices, particularly in export-oriented areas.

3.3. Changes in Trade Balance

Changes in export and import of various sectors in Indonesia because of a policy to increase the price of sugar, will affect Indonesia's trade balance as presented in Table 2. At baseline, it is known that Indonesia's trade balance is positive, meaning that Indonesia experienced a trade surplus. Sector, which contributes over Indonesia's trades surplus in 2008 is in a row starting from the largest is the paper and printing industry (IDR.876.257trillion), the agricultural sector other plants (IDR. 508 billion), mining (IDR. 227 billion), industrial wood and wood products (IDR.132billion) and fisheries (Rp.66 trillion). Other sectors experiencing a trade deficit (negative trade balance).

Table 2. Changes in trade balance with rising price of sugar

No.	Sector	Balance of Trade			
		Baseline (trillion IDR)	after price change (trillion IDR)	Change	
				(trillion IDR)	%
1	Food crops	-35	-33.9996	1.0004	2.86
2	Sugar cane	-138	-140.995	-2.9946	-2.17
3	Other crop farming	508	508.9956	0.9956	0.20
4	Animal husbandry and results	-55	-55	0	0
5	Forestry and hunting	-2.529	-2.53545	-0.00645	-0.26
6	Fishery	66	64.9989	-1.0011	-1.52
7	Mining	227	231.9954	4.9954	2.20
8	Sugar industry	-11	-10.0001	0.9999	9.09
9	Food and beverages industry	-192.983	-191.974	1.008717	0.52
10	Spinning and textile industry	-199.806	-199.806	0	0
11	Wood industry and manufacture	132	131.0064	-0.9936	-0.75
12	Paper and printing industry	876.257	875.2912	-0.9658	-0.11

No.	Sector	Balance of Trade			
		Baseline (trillion IDR)	after price change (trillion IDR)	Change	
				(trillion IDR)	%
13	Fertilizer and pesticide industry	-128	-128	0	0
14	Chemical industry and cement	-768	-762.967	5.0334	0.66
15	Electricity, construction and trade	-1.159	-1.1702	-0.0112	-0.97
16	Restaurants and hospitality	-131	-130.006	0.9945	0.76
17	Services	-5.472	-65.331	-59.859	-1093.91
	Total	141.308	90.50414	-50.8039	-1083.44

Trade surplus may reflect Indonesia's export performance was increased and his imports was decreased. Positive impact generated from surplus trade balance, among other things, deficit in current account was going down, so there was potential for IDR's value to strengthen.

An increase in sugar prices led to decline of Indonesia's trade balance about IDR 141.308 trillion to IDR 90.504 trillion. This impact was still slighter than impact of liberalization on sugar trade balance (Pudjiastuti *et al.* 2013; Pudjiastuti 2014). A significant decline in trade balance would decline government revenue because of the value foreign currency (foreign exchange) changed. As a result, domestic currency (IDR) in circulation became more than foreign currency (dollar), causing the depreciation of IDR against foreign currencies. However, following Ishchukova and Smutka (2013), the total agricultural export flows specific groups of products according to their comparative advantage (or disadvantage) and trade balance. An agriculture commodity that have a comparative advantage will generate a positive trade balance, and vice versa. On the other hand, Rezbova *et al.* (2013) revealed that the price of beet sugar in Europe is also seriously affected by many technical factors that include beet yield, the sugar content of the beets and the sugar yield.

This condition can't be underestimated because it can cause trade balance deficit. Trade balance deficit as it did in 2012, for the first time in period 2003-2013, has felt an impact which reduced foreign exchange reserves and a direct impact on the national economy as a whole, especially with regard to inflation, and interest rates and appreciation of dollar in money market. The latter factor makes the appreciation of IDR back impeded and weakened in money market transactions. In addition, condition of manufacturing industry in Indonesia has not been able to support or do not meet the requirements of free trade because of poor infrastructure, low productivity, high credit interest, high transport costs, and lack of readiness of human resources. The main factor, Indonesia has not been able to saturate the needs of capital goods, so as to oblige Indonesia to import capital goods from other countries.

Some of activities can be done: (1) government must lobbied other countries to suspend Free Trade Area (FTA) due to adverse impact for domestic economy, (2) restricted to export of raw materials, (3) developing a domestic manufacturing industry and strengthen industry sector upstream through realization of foreign investment and focus on development of the upstream sector, (4) Indonesia needs to do to improve the quality of human resources so that it is resulting in creased productivity. Efforts to improve human resources training can be done by man power, and introduce the latest technology to work force, (5) reducing consumption of fuel oil that can reduce fuel oil imports.

The results of this research was influenced by elasticity of some variables. Research by Akpan *et al*. (2011) found that the values of elasticity for the specified variables reveal inelastic relationship of technology based capacity utilization sugar with respect to the sugarcane price, wage rate of skill workers, human labor, and industry's real research expenditure in Nigeria.

Findings research by Amir (2013) aligned with this research. The export tax policy potentially increases government revenue by about Rp15 trillion from export taxes and indirect taxes. But this is partially offset by a decline in income taxes. In order to accelerate removing the negative impacts of the policy, and attract new investment in the mineral processing industries, the government could use some portion of its additional revenue to give incentives in these sectors. Some other portion could be used to create a buffer program for the labor of minerals industries to soften the negative effects on unemployment and reduce the time of transition to find a new job. The government also could spend additional revenue on infrastructure projects that related to mineral

processing industries. For example, develop road networks connecting the raw mineral industries to the manufacturing process and seaports in order to transport the processed mineral commodities to international markets more efficient. It is necessary to reduce the initial investment in developing new plant for processing minerals and ores.

Kristkova and Ratinger (2013) shows that the extent of grasslands would be gradually increasing in the following periods, which can be explained by an increasing real income of households. But, when the revenue from the beef is complemented by additional government support, the amount of land employed in the extensive livestock sector growths substantially. The sudden fall of grasslands´ size in 2009 is attributed to the GDP decline which occurred as a result of the ongoing economic and financial crises and has a repercussion on household demand. In 2020, the size of the landscape stabilizes at 1,300 ha, indicating a positive impact of additional governmental support on extensive farming. These findings suggest that government policies in the agricultural sector should be combined.

Bahta (2014) findings: an increase international oil price shows that, the percentage in labor demand of transport, other services, agriculture, and manufacturing sector decrease. The GDP of the over all economy decrease by 0.01%, the highest decrease observed in transport sector followed by other services, agriculture and manufacturing sector. The results suggest that it is inevitable that there will always be some external shocks outside the control of economic policies. Hence it is necessary to strengthen the effectiveness of economic growth by incorporating target available resources and ensuring coherence in policy design.

Conclusions

An increase in sugar prices in Indonesia have impact on domestic output, exports and imports, not only on sugar commodity, but also on commodities which was produced by existing sectors in Indonesia's economy. In agricultural sector, domestic output and import would increase, and exports would drop, but trade balance was still in surplus. On the other hand, in industrial sector, domestic output and export would drop, as well as import would increase, and trade balance would deficit. Sugar import seven increased by 9:09%. It needs to watch out by government. But what happened in the service sector was largest trade balance deficit under rising price of sugar. Indonesia should be aware of in setting policy of raising sugar price. Government should organize domestic economy become better off.

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